

X
THE RELATIONS OF LITERATURE, SCIENCE, & PHILOSOPHY
IN
UNIVERSITY EDUCATION.

By

W. E. Fothergill. M. A., B. Sc., Edin.

1889.



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RELATIONS OF LITERATURE, SCIENCE, AND PHILOSOPHY IN
UNIVERSITY EDUCATION.

I.

Relations of Literature, Science and Philosophy.

Thought
distinguished
from feeling.

Two men are watching a setting sun across a sparkling sea; both their minds are moving in response to the scene before them, but in widely different ways; one is feeling, the other is thinking. There may be a thousand other differences between their modes of mentality, but we attend to this, and first we feel with the one the green and gold blending into harmonies ever more perfect, whilst by the other our attention is called away from the purely sensuous beauty of the scene to the sun's distorted disc, and our minds plunged into calculations concerning the refrangibility of rays, and speculations as to the limits of the luminiferous medium.

Series of minds

Human minds might be arranged in a series with the

founded on
this distinction.

man who feels pre-eminently, and thinks very little at one end, and, at the other, the man who analyses every impression and applies conscious reason to every phenomenon, but feels little emotion on the contemplation of any of them.

Between these extremes would come, in order, less highly differentiated minds, until midway would be placed those which, evenly balanced, think and feel equally in turn, for one mind works in many ways, and in making this division of men into those who feel more than they think and those who think more than they feel, I need hardly say that I refer only to their prevailing mental attitudes.

This, of course, is one of many bases on which men could be divided into broad classes according to their "turns of mind" and the present purpose demands that we consider one other.

The General &
the Particular
distinguished,
& a second
series of
minds suggested.

Passing under review all the men whose minds we know, it is easy, in most cases, to say whether they are more forcibly arrested by the concrete details of the world around them, or attracted more strongly to

the consideration of generalities. Some must probe with analysis the separate facts of nature, while others, more synthetic, are irresistibly led to seek wide and ever wider relations between them. We might, then, arrange humanity in another series with the supremely generalising mind at one end, and the narrow specialist at the other, and midway between them the man who is capable of being equally interested in details and in wide relations being analytic and synthetic alike. But as one mind assumes, in turn, many attitudes towards nature, we shall handle the expressions of these attitudes in language more easily than the minds themselves.

A corresponding series of expressions of mentality.

Music is the most direct language of emotion. To feel its spell no reasoning is demanded, for the soul of the singer speaks straight into the soul of the hearer with no medium but sound and nothing to be interpreted.* Painting and sculpture are not so direct;

* Of course I do not mean that musical criticism demands no reasoning; but this includes appreciation of the art of expression as well as of the feeling expressed.

their language demands that thought, often indeed unconscious, interpret it before it can convey its burden of feeling. They express emotions by representing in colour and form certain objects with which the desired emotions are associated. The sensuous charm of line and colour is great indeed, but this is the charm of a pattern, not that of a picture. Next comes pure literature, the most indirect language of all, since it represents in words the objects round which the emotions of the poet cluster, and thus conveys them to the reader's soul through his more or less unconscious reason. Distinctly more intellection is demanded by the indirect language of imagery in words than by that in form and colour. Think only how a dawning mind grows to the appreciation of the varied languages of feeling. A baby is soothed by a tune, which demands knowledge of nothing, before it is pleased by a picture, which demands the knowledge in real life of the things pictured. I speak, of course, of pleasure beyond the merely sensuous one of colour. The picture, again, demands much less intellectuality than word imagery, which

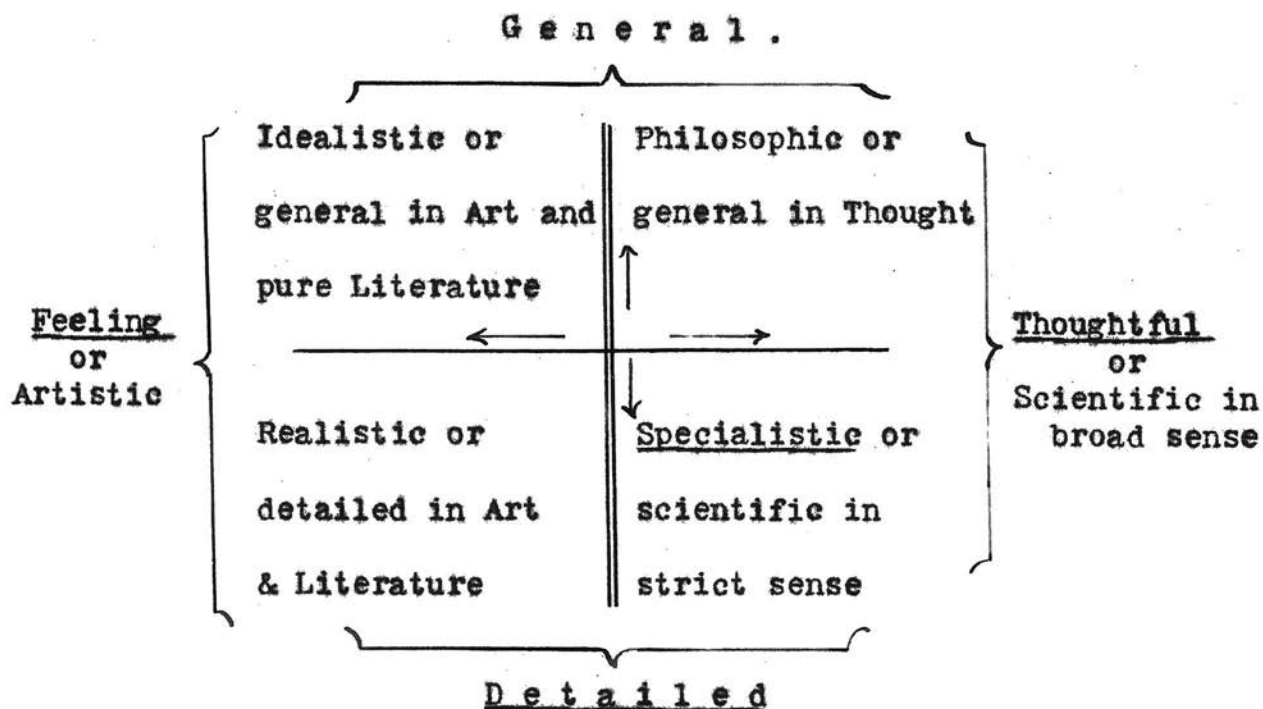
requires the somewhat complex operation of connecting words with things which must themselves be known in real life. Once in the language of words we pass slowly & by imperceptible stages from the artistic region of pure feeling to the intellectual one of pure thought. The greatest prose & poetical works are often not pure literature at all, but permeated with science and philosophy. Much poetry is, indeed, unmixed intellection in verse, and scientific writings are often so closely interwoven with artistic descriptions that to say whether the feeling or the thinking element predominates is not easy. In the larger half of Mr. Browning's poetry is thought or feeling more prominent? In "Romola" does the grand philosophy or the subtle delineation impress us most? In Plato the artistic & dramatic element is not far behind the philosophic, and some modern writers on purely scientific subjects charm us no less by the lucidity of their style, and the graphic nature of their descriptions than they instruct us by their clearness of thought and scientific perspicuity. We can, indeed, draw no harder line between

literary & scientific writings than we can between emotional and thoughtful minds, but "It is a dull and "obtuse mind", says Calvin, "that divides in order to "distinguish, though a still worse that distinguishes "in order to divide", so we will adopt the course of every scientist and fix our attention on well marked types, dismissing the harder forms from our immediate consideration.

Dividing writings, therefore, into two sorts, the one purely artistic or literature proper, and the other thoughtful or scientific and philosophic, we now apply our second fundamentum divisionis, which placed men's minds under two headings of analytic or particular and synthetic or generalising, and we may call literature, or the artistic consideration of nature expressed in words, mainly realistic or mainly idealistic, according as the general or the particular faculty of mind has been concerned in its production, and in the same way thoughtful consideration of nature into specialistic or that which handles details, and the philosophic or that which deals with wider relations.

Diagram.

A simple Diagram may give clearness of ideas regarding this two-fold division of mental attitudes,-the artistic, with its division into the realistic and idealistic,- and the thoughtful and its corresponding division into the detailed and the general.



Let the double line be the position of minds who feel and think equally. We must place men more to the right as their thoughts predominate over their feelings and more to the left as they feel more than they think. In the same way let the single line represent the position

of those who specialise or generalise with equal facility. The Idealist in Art & the philosophic Thinker must be moved up the page; the Realist and the Scientist who works with details, downwards. Men whom we leave on the level of the page will be of average mental power. Those who in force exceed their neighbours we may raise vertically above the page in proportion as they do so, while those whose powers sink below the average we must place proportionally beneath its level. Goethe, for example, we might place a little to the right, as thinking somewhat more than feeling, some distance above the single line as more a philosopher than a specialist, and high above the page as having a mind far above the average of mankind. Raphael we should doubtless place far to the left as eminently more feeling than thinking, far up the page, as idealistic rather than realistic, and, again, high above its level, as a man far above common humanity. At the intersection of the lines on the level of the page will be, of course, the ordinary mortal who thinks and feels alike, but does neither very much, being neither

above nor below the average of his race,

Our present purpose calls for no further consideration of the distinction between the synthetic and analytic in feeling. On the thoughtful side, however, we must carry farther the distinction between the general and particular ways of looking at things, for the reader will have seen that it is this which explains the relation between science and philosophy.

Summary.

This trio, then, of literature, science, and philosophy must be looked upon not as three separate objects of study, but as the answers to man's questioning of nature in three different ways - his conceptions of her from three points of view, - the artistic, the thoughtful as to details, and the thoughtful as to general truths.

We have seen how each merges into the other like the features of a landscape viewed from successive points. Sun and stars, winds and waters, all the lower forms of life, but most of all man and his passions are the subjects that occupy poet and thinker alike. The difference between their points of view is

now evident, but the distinction between scientist and philosopher still claims some attention.

Of the
scientific
method.

The scientific investigation of natural phenomena is conducted by the application of logic and mathematics, the forms of thought first to separate facts, then to small groups of them, thence to larger ones and so on up to the widest generalisations of philosophy. The extension of the frontier of knowledge into the unknown is like the advance of a great army with many companies and many regiments. Each man in each company must mind his own business and consider only his relations to the men beside him within its ranks, while each Captain must co-ordinate the movements of his particular company with those of all the companies in his regiment, but is not concerned with the operations of any other. The Commander of a regiment has still wider relations to bear in mind, until at last we come to the Commander-in-Chief who holds in view the whole army in wide and comprehensive survey, troubling, however, with the working of no particular part of it. Thus it is that the separate facts of Astronomy, Physics, Chemistry,

Geology, Biology, Sociology & Theology are worked at by an army of specialists whose plans of action are formed and whose results are correlated by the more philosophical workers in the separate sciences, while the labours of these are directed and their results are unified in the still wider generalisations of the supremely philosophic thinkers who deal with the details of no science but with the truths pervading them all. Clearly these must be master minds, and thus it is that in every age those that have left their marks in Science have been, not the specialists, be philosophers, men who have struggled with the widest and deepest questions that concern mankind.

Thought is often called, speaking loosely either science or philosophy; for, indeed, all of it is scientific and all philosophic in some degree, so that in confining the strict use of the word "science" to the more analytic and detailed, and the word "philosophy" to the more synthetic and general I must carefully guard against being misunderstood. There is a narrowing and a real, though slight, alteration of the meaning of the word "philosophy" as it is now used

in accurate language which is not yet universally understood nor generally accepted, and this I may be excused for explaining.

In all thoughtful consideration of the world around him man must use one and the same method. Observation of and experiment upon facts as they enter consciousness must suggest a hitherto unrecognised relation as existing between them. This must be expressed as a theory or hypothesis,- an act of speculation,- and that the suspected relation is a really existing one and the explanation based upon it is the true one must be proved by a return to the facts of the case. This third process is of course verification. But this only way to truth, apart from revelation, this "Systematic enquiry into the action of the forces of nature is the "tardy product", as J.S.Mill puts it, "of a long course "of efforts to use those forces for practical purposes." The early efforts of mankind to read nature's page were necessarily incomplete and faulty. The ancient philosophers observed indeed, and speculated, sometimes rightly, more often wrongly, but here their work ended,

Ancient
Philosophy.

the third essential part of the thought process was omitted, they never verified. In the history of ancient philosophy we have a series of the most tragic events the world has ever seen. The best part of mankind struggled hopelessly to accomplish an impossible task through having fallen into a worthless method, and this not once, but again and again. A sad and solemn history it is, but we must reverence these ancient gropers in the dark, for from them came the method, the data and the brains of to-day. We must hold as a building founded on and formed out of the past the magnificent structure modern thought has reared. The old philosophy is the father of the new, even its latest development, the conception of universal evolution, is no new thing, but the outcome of the work of a line of thinkers the first of whom was Aristotle and the thirty-seventh, Charles Darwin. A gradual growth with its roots hidden in the darkness of the Middle Ages was the method of perfected dialectic, the "Novum Arganum" was its blossoming, and the fruit it bore is the whole of inductive science. After Bacon's time the systematic study of nature gained a new footing. It was con-

The develop-
ment of the
inductive me-
thod.

ducted on a newly recognised principle and under a new name. The early strugglers were rightly called philosophers for they were lovers of knowledge if nothing more, but when the inductive method placed actual knowledge of certain relations within man's reach a new name was applied, and the word used was science.

Dr. Reid
quoted.

Dr. Thomas Reid, the "Father of Scottish Philosophy", speaks in this sense when he says, "Admired
"philosophy! Daughter of Light! Parent of Wisdom and
"Knowledge! If thou art she surely thou hast not yet
"risen upon the human mind, nor blessed us with more
"of thy rays than are sufficient to shed a darkness
"visible upon the human faculties, and to disturb that
"repose and security which happier mortals enjoy who
"never approached thine altar nor felt thine influence!
"But, if, indeed, thou hast not power to dispel these
clouds and phantoms which thou hast discovered or
"created, withdraw thy penurious and malignant ray, I
"despise philosophy and renounce its guidance, let my
"soul dwell with common-sense."

It is strange that so many undoubtedly magnificent

minds should have so obstinately persisted in error, but human nature seems to think the greater the man the greater the fault, and these perhaps deserve all their abusers give them. They certainly do not deserve the name of the glorious old sages who founded our mathematic and dialectic science, and who taught us the most profound truths, feelings as they were rather than doctrines. No more do they deserve the name which has by common consent of the leaders of modern thought, been applied to the more synthetic and deeply thoughtful of modern scientists in distinction from those who devote themselves to more special and analytical work.

What then became of the word philosophy? It gradually became used in a changed sense, not much changed, however, for the highest and widest questions under the consideration of the thinkers of an age must always be treated in the tentative manner of the old philosophers rather than in the definite style of modern science. But, none the less, its sense is altered, for the method is changed. Although speculation for its own sake has been largely given up, and it is

now mostly used as a step preceding verification, many thinkers, unfortunately, have failed to see the vanity of new speculation and have continued to theorise for theorising's own sake, content with a hypothesis that is only self consistent, and paying no regard to the facts of the case. These have all called themselves philosophers and the name has thus fallen into disrepute with many, and very naturally seeing that they still consider philosophy as a series of hopeless attempts to form theories, one as good, or rather as bad, as another, concerning things no one can know anything about,- efforts to build a mental tower beginning at the top instead of working upwards from a firm foundation.

The growth of
Science.

The perfected method could not, of course, be at once applied to all branches of enquiry. The first Sciences were those of the simplest facts. The almost abstract relations of matter and energy in time and space first founded the Science of Astronomy. The knowledge of the properties of matter and the forms of energy was the next to be organised. In every branch

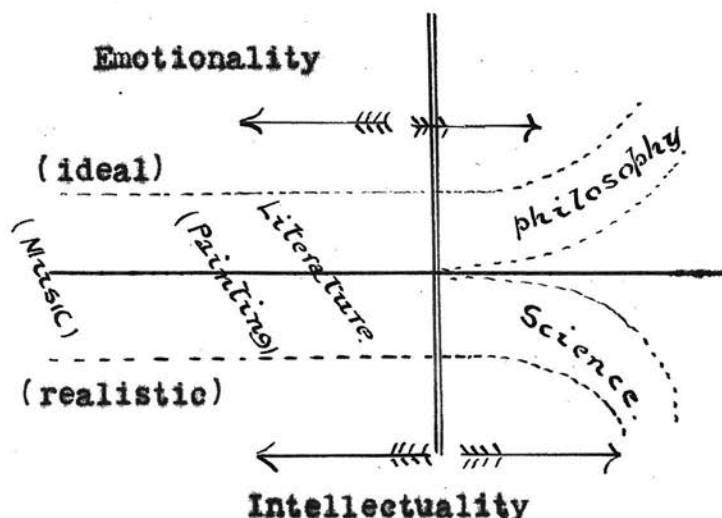
Oscillations. of research men began by oscillating wildly from one view to its opposite, and at first a Science advances slowly in a zig-zag course till fundamental laws are inductively established, after which it can progress in a straight line of development. Fierce were the struggles between the students of Volta and Galvain as to whether the electric current they all felt, was due to the peculiar juices of the frog in destruction from all other juices, or due to the peculiar nature of the two metals which were in contact. But when they discovered that almost any two metals would do, and also that there was nothing electrically peculiar to the fluids of the frog, their strife ended and electric Science began to advance with straight and rapid strides. Similar has been the history of all physical Science, of Chemistry and of Geology, but in the Sciences of life and mind and morals, direct development has not yet begun. Even now there are many signs, at home and abroad, that we are on the eve of a change of direction from that in which Biology has advanced since the publication of the "Origin of Species", and

it may still be long before a straight line of development can be assumed. The psychological and sociological sciences pursue, as yet, courses which appear eminently wavy to any but those travelling along them, and though the very best of minds have always striven to solve the higher questions of these sciences, the complexity of these facts is so great and so difficult is it to establish relations between them that they are truly not so much knowledge as the love of it. Students of life and mind have adopted the right method, but the difficulties in their way are so great that the mental and moral sciences retain more of the character of ancient philosophy than the physical and natural, not that these are without their dark places. What is the medium of light, or what the force of gravitation are as purely matters of speculation as any in the range of mental science; what is the life of the smallest uni-cellular organism is just as unknown now as ever, and workers at wide questions such as these are philosophers in the modern sense of the word just as those of mental science.

The likeness
of the new to
the old Phil-
osophy.

Recapitulation For the length of this preliminary analysis my only excuse is the fact that no definite & generally accepted conception of the relations of literature, science and philosophy is expressed by modern writers. The real difficulty of the subject of this essay demands a clearly stated convention as to the terms and an understanding of the relations inter se of their meanings. The analysis which seems to me, personally, the clearest and most workable in considering the materia of university education I have, therefore, given above in no dogmatic spirit, but merely to be understood in the development of the subject, and for the sake of clearness I will briefly summarise the position from a somewhat different point of view. We have looked upon the expressions of mental activity as arranged in a series beginning with the pure emotion of music and passing through the more intellectual forms of painting and sculpture into pure literature which, of course, is the point where the expressions of mentality we are considering are taken up as materials for ordinary university education. Proceeding from

pure literature towards the expressions of pure thought, we come to a point where the series branches and divides into two parts, the one expressing the more detailed and special kind of thought, the other the more wide and general,- the one Science, the other Philosophy. This view of the subject of course coincides with the expression of the same relations in our former diagram.



II

The foregoing Analysis as bearing on Universities.

A. Nature and Function of University Education

B. (1) Literature

(2) Science and Philosophy. -----

Meaning of
University
Education
defined.

A. Let us now clear up our ideas as to the use to which we wish to put the material the preceding analysis arranges for us. University education I take to mean not special preparation for various walks in life, though to give this, is, of course, part of the function of a modern university. We consider here the action of a University training in developing youths, not into lawyers or doctors, but into men. We mean by University Education the "culture" of Matthew Arnold, the knowing of the best that has been thought and said and done in the world;- that which, in short, it is the aim of the Faculty of Arts in modern universities to give. Professor Butcher said in a recent address, "Now "the Faculty of Arts, as distinguished from the pro-

Professor
Butcher
quoted.

"fessional faculties, is a witness to the original and
"proper function of a university as a place for the
"training of the human mind as such, without reference
"to the special vocation of after life. Its motive,-
"its governing principle,- is the disinterested love of
"knowledge, knowledge not as a means to an end, but as
"in itself a good. Literature, art and science are all
"comprised within the faculty, the different methods
"are here represented by which the human mind pursues
"truth or strives after beauty, the several departments
"being reviewed as forming an ideal unity."

The discus-
sion intro-
duced by a
list of mat-
erials.

I can give here only the general results of a
careful comparison of several homes of the undivided
sciences, as the full historical treatment of the sub-
ject would be of great length, and I have not found it
particularly instructive in the present line of treat-
ment. We may sum up in the usual order the materials
for culture, and see how the universities make use of
them. On the artistic side we have the literature of
all times and nations expressing feelings for all
phases of nature. On the thoughtful or scientific side

we have the two great methods of logic and mathematics, with their applications to all groups of natural phenomena,- each group with its science and its philosophy, the study of its details and the conception of its wider relations. We may recapitulate these after Comte, Mill and the rest as Astronomy, Dynamics, Physics, Chemistry, Geology, Biology, Psychology, Sociology and Theology, with the science of Philology and the various forms of history. Now let us see what is the somewhat hard and fast way set up by custom as the best plan of general education to fit, for any line of life, a young man who lacks time, money or inclination for the study of branches other than those recognised by his university in giving Arts degrees, considering, of course, the least, she demands,- not the most she allows to candidates for her favours.

B.(1)

Why Music & Fine Art are not essential in University education.

We notice first that literature alone represents the artistic side of culture. Music, painting, sculpture and architecture form no part of the regular academic course recognised as qualifying for an Arts degree. This, indeed, is right and natural. Books are

necessarily the common medium of communication between the student and the world's thinkers and actors, and in the pages of pure literature every phase of human emotion is expressed with greater definiteness, if with less intensity, than in the fine arts proper. Expression in the more direct languages of feeling depends not on powers of reasoning, but on sensitiveness to sound and form and colour, and this is developed not in lecture room and study, but in constant intimate communion with nature and through patient work with hand and ear or eye. Music and painting have flourished in schools other than the universities, and it may be best that they should do so, though we can imagine future developments bringing them as near, geographically, as they have always been in spirit to the haunts of the other muses.

Literature completely representative of the artistic spirit, but improperly used.

Literature is indeed completely representative of the artistic spirit, but, having the right form of expression on which to educate the artistic side of man's nature, we commonly find it used as if other aims were in view, and made the medium only for mental gymnastics

Ancient Literature

and the communication of the facts of history and philology. The Study of ancient literature affords magnificent exercise for the reasoning powers, exercise almost equal in value to scientific training in the applications of logic and mathematics. It teaches, also, the most important parts of the history of civilisation and something which we may call the embryology of science and philosophy. I can say definitely, however, from personal knowledge of his genus, that, in the mind of the student of literature, each one of these elements is more prominent than the one which should be foremost, namely the artistic,- the records men have left us of feelings and emotions called up by their contemplation of nature. It is true that in the study of works in his own language this element occupies a larger share of the student's attention. But in reading English literature, though free from the disturbing influences of obscure grammar and doubtful readings, we often choose a work half-way between scientific exposition and the gush of pure lyric, reduce its thought from solution in an artistic medium

Modern Literature

and imagine we are studying literature with the proper aim. We are, on the contrary, viewing something, doubtless valuable as a piece of history or biography, in a purely scientific or philosophic spirit. Border forms of writing, expressing neither clear thought nor well marked feeling are our favourite literary studies; and if we do hit upon a specimen of literature so pure that we can extract no thought from it we usually pass over the burden it would breathe and examine it as an example of some particular style of composition.

Common arguments for literary training stated and refuted.

The upholders of a literary as opposed to a purely scientific training usually advance the argument that, more than any other study, it affords discipline for the memory and the logical and analytical powers,- in other words, that it gives a better scientific training than science itself, acquainting the learner at the same time with facts of history and biography, most valuable in after life.

To this it is opposed that the desired discipline is afforded much more advantageously in the study of some branch of science, that the facts learned in the

The real
reason why
literature
must be
studied.

study of scientific subjects are of infinitely greater value in the after life of most men than those given in a literary training; and that such facts are most quickly and easily learned when treated as branches of science. The advocates of scientific education have here so obvious an advantage that it is not easy to see how the literary holds its own. It is doubtless because the study of noble works of art, however mis-directed, cannot fail to call up higher feelings and do its true work in a measure, and because men feel that the emotional view of life is, after all, the one more closely bound up with its action and reality. They feel that it is less liable to error than the thoughtful, and nearer the divine. The difference between the literary and the scientific is nothing more nor less than that between faith and reason, between religion and morality. Ethical philosophers tell us that without emotion the clearest judgments in favour of the good and beautiful can never be translated into action, and the same emotion which the study of art developes becomes the motive power along right lines of conduct. Well, it is then, that the world does not depend for

its deeds upon the bookworms of its universities, squashed into space of two dimensions between the leaves of their fusty folios, whose affections and emotions have never been educated by actual contact with men and affairs. Loves and hatreds are the dynamos that drive our mental and moral machinery, and he who cultivates the intellectual at the expense of the emotional must pay the penalty of a cramped existence. Why, then, should literature, the only thing of emotion admitted within the Arts courses of our universities, be defended only as a scientific discipline and a museum of anthropology? Why should it be dissected by literary anatomists while the emotion which is its life blood slips away unnoticed amongst evident anachronisms and undoubted amphilologies?

The need for
changed method
in the
study of
literature.

That artistic training is an essential part of every university education I think we shall agree. It need not be sought in the literature of the dead languages, for there is enough and to spare for the emotional education of any man in that of modern tongues,- nay, in our own. The history,- philosophy

and philology which are so intimately associated with the classics may, in a more evolved state of education, be separated from artistic culture and studied in their logical places as branches of science. What we must do at once is to recognise as an important element in literary study, the emotional, and to distinguish it carefully from the other factors, which for the sake of convenience, are at present studied along with it. That this is not mere dreaming is amply proved every day in one of the literary class rooms of our own Alma Mater, where the spirit that breathes from works inspired by worthy feeling influences every student, whether he know it or not, in a manner which must do more than any amount of argument to promote the true spirit in the study of literature, and to raise up, even within the academic walls, an appreciation of poetry as expressed in languages other than words.

Summary of
conclusions
regarding
literature.

Before leaving the development of the emotional side of human nature to consider the relations of science and philosophy in university education we may

summarise the conclusions already reached. We have seen that in any general education, it is no less important to cultivate the emotional side of man's nature than to develop his thinking powers. As the other forms of art seem, at present, somewhat unfitted to fulfil this function, a literary course is a necessary part of every university education, holding its place, not in virtue of the intellectual training and knowledge of facts it affords, but for the sake of its value in developing the emotional nature.

- (2) Turning now to the other part of the subject, I am surely warranted in omitting to re-state the arguments that show the importance of the scientific element in university education, while emphasising the value of the literary and philosophic. So forcibly have recent writers shown that scientific training is an indispensable part of culture, that to do so here would be quite superfluous. I have no excuse for repeating work long since completed, to give only one example, in Mr. Herbert Spencer's work on Education.

Limited nature of most "Arts" courses.

In considering the scientific and philosophic departments of our universities we are at once struck by the fact that the study of the same subjects is required from every candidate for a degree in Arts, whatever be his natural turn of mind and in whatever direction his life work is to lie. Whether a man intends to be a clergyman, a lawyer or a doctor, an engineer, a landlord or a statesman his mental development must be conducted in exactly the same way, so far as its course, previous to the professional school or the wider one of life, is directed by his university. We have said that the object of the education we are considering is to make a man, and not to give technical instruction, but this is utterly different from saying that all are alike to begin with and are to be made, in the same way, into similar men. Men are unlike to begin with, & move in unlike ways to unlike ends.

Gaps in the course in "Arts".

A curriculum in Arts includes, of course, logic and mathematics with their applications to physics. Then comes a gap amongst the sciences, for Chemistry,

Enough sub-
jects in-
cluded.

But why
always the
same?

Geology, Animal and Vegetable Anatomy and Physiology are entirely absent. Ignoring them we usually pass to Psychology and Ethics with the History & Philology taught as literature, but Sociology, Economics and Theology are wanting. Now it is plain that no single student could study all the sciences as part of his degree work, and it is also certain that those which are generally included in the programme are quite enough, so many, indeed, that only their elements can be learnt. The mere fact that, on a range of subjects thus limited, so many able and cultured thinkers are always being educated shows without a doubt that there is no lack of breadth in ordinary university education. But, this being so, the unanswerable question at once arises,- Why are these subjects chosen as representative science rather than any others? Though the men to be educated vary in mental qualifications, in tastes and in aims, they are permitted no choice of materials for culture. Though other subjects are as eminently fitted for the purpose as those in use, yet, in many universities, degrees can only be obtained in one particular set of

The real
object of
scientific
training.

subjects. It is absurd to say that the prescribed subjects are those which every cultured man must know. In what way is a knowledge of the facts of physics deeper than that gained at school more useful than acquaintance with those of Botany, Zoology, Geology, or Chemistry? Must we believe that moral philosophy is of more value in real life than economics? That it matters not what a man learns, but how he learns it, is plain, since the primary aim of education is not the acquisition of knowledge but the development of mental power,- not facts but the power of dealing with facts. The object is not to lay on intellectual fat, but to develop mental muscle; and a competitive examination should not be a measurer of mental contents, but an intellectual dynamometer.

We saw that the object in studying literature was not to acquire the names of books and the dates of battles but to learn to appreciate high feelings and noble acts, and, similarly, the aim of scientific study is not to know the names of bones and beetles but to get the power of observing facts and seeing relations

between them,- the power of thinking and appreciating the thought of others. In this process, masses of facts must necessarily be dealt with, and, seeing that one sort of phenomena offers as good mental exercise as another, they should surely be those most tasteful to the learner & most likely to be of service in his after life.

The best
plan of
education in
Science &
Philosophy.

The plan of education should not be to traverse a wide range of sciences at a low level, but to begin with the minutest details of some small groups of phenomena and work upwards from these, relating them with wider groups and finally rising to the purely philosophic to see the broadest truths as exemplified in the facts studied in detail. We may compare the sciences to a set of paths up a mountain. The student may set out to climb from the foot of any one of them for they all lead to the top. Having reached the philosophic summit he can see, not only the path he came up and every foot of which he knows, but spread out beneath him lie all the other paths as well. He cannot see their details, he must descend again to do

that, but he holds all in their true relations and is in a position to choose which he likes and make of it what he will. A man may walk forever round the foot of the mountain amongst the details, perhaps talking about the philosophy above though he has never climbed up to it. He may go up part of the distance on one path and then walk round the hill-side to finish the ascent on another. This last is what is done in our universities. We study the details of Physics and treat them in an eminently scientific manner, then shift round to the mental sciences for our philosophic training. This is by no means a bad way, since the physical sciences are far removed from human interest, and, to those who have not more than usual knowledge, their philosophical part is difficult and somewhat unattractive, while the mental and moral sciences, though of supreme human interest, are very complex and hardly afford good ground for the study of the scientific methods in simplicity. But between the purely physical sciences and the mental there comes the whole range of natural or biological science closely related to the physical, and

Omission of natural science from most "Arts" courses.

thus possessing much clearness, and vieing with the purely mental in human interest and philosophic breadth, its philosophy being, indeed, the foundation and necessary companion of that of the mental sciences. Not only is natural science thus eminently fitted for use as an instrument in both scientific and philosophic education, but its facts are extremely valuable in many walks of life, yet it is only now beginning to receive a place in Arts courses, and all who, encouraged to study it by recognition of their work, are professional men in medicine or pure science.

This omission not obviated by Scottish "Honours" courses.

It cannot be said that the freedom of choice allowed in reading for honours obviates this defect. The honours man in Scotland, having worked all the compulsory subjects up to the standard demanded by a pass examination, usually reads for honours with a view to some professional or other special purpose during Sessions after he has completed the ordinary course. It must be allowed that the principal English Universities are distinctly in advance of the Scottish on this matter. At Cambridge, for instance, even in reading for the "pass", after a general examination in his

Comparison of these with those of Cambridge.

second year, a man confines his attention to special subjects in whose choice there is ample freedom. Reading for honours is done during the years of an ordinary course and not after its completion. Each man has complete freedom in choosing the branch in which he will take honours, and works at it undisturbed from the commencement of his second term, the first alone being occupied with the "little go", a test of general knowledge whose severity ranks between that of a "medical prelim." and an Edinburgh "Three sessions curriculum".

Advantages
of free
choice of
subjects.

It would be an immense advantage if in all our universities, determined by natural bent & future aim, every student might select the two or three groups of facts which should form the field of his studies. Given a school education of moderate efficiency, an adequate university training in literature, logic and mathematics, it is surely plain that a future engineer will graduate in dynamics and physics with greater advantage than in any other branches of applied thematics; that a future medical student will take an Arts degree effectively in the anatomy and physiology of

plants and animals, and that preparatory to special education for the Church or the Bar one will prefer to fix his attention on Psychology, Ethics & Economics.

Need for
Philosophy,
and practical
suggestions.

But while it is useful to specialise early, with a view to the future, it is also most important to bear in mind that narrowness and want of philosophic breadth is the inevitable result of too early and complete specialisation upon one set of phenomena. To avoid this it is necessary that more than one Science be studied, and that one of the chosen branches be specially representative of the philosophic stand-point. One or more of the mental sciences would naturally be associated, for this purpose, with pure logic, and we should thus have a group including ethics, economics, with the various branches of sociology and history from which to choose them. Philosophy, thus represented, free choice might be allowed between physical and natural science, always, of course, postulating a certain knowledge of pure mathematics. In the group of physical sciences some choice should be allowed between the higher Mathematics, Astronomy, Physics, Dynamics and Chemistry,

and in the natural sciences, between Geology, Botany, Zoology & Physiology.

The argument confirmed by reference to history.

The name "Natural Philosophy" has some meaning for us in the present connection. It used to mean the philosophy of the natural as opposed to that of the mental world, and a complete education combined natural and mental philosophy. Both of these have now grown so large as to demand sub-division, but this is no reason why some of the parts into which they have been broken up should be chosen for the general education of all men rather than others. Why should not each man choose for himself the parts he will take as representative of the spirit of the whole? The Chair of Natural Philosophy in Scottish universities used actually to include all that is now known as the natural and physical sciences. New Chairs were afterwards created for the separate branches as they grew, but these were devoted to the use of professional and special students instead of being retained within the ideal unity of the Arts Faculty and allowed to qualify for its degree. "The whole group of Natural Sciences", says Professor

Butcher, "ought, logically, to be included in the
"Faculty of Arts, as it is in the corresponding Faculty
"in most foreign universities - the Philosophic
"Faculty."

We can hardly estimate the improvement which would result in the standard of general culture, could the ancient and reasonable condition of things be restored, for there is no doubt that more men and better men would take Arts degrees could they do so in subjects which would be of some definite use to them in after life, affording, at the same time, general education. Indeed, so unscientific and unnatural is the present system that it cannot long persist in the Arts Faculty of any university.

Summary

Briefly summarising then, we find science and philosophy imperfectly represented in our Faculties of Arts, which should logically unite them in an ideal unity. Chemistry is wanting among the physical sciences; the group of natural sciences is wholly absent; and the mental are represented by Psychology and Ethics alone, while all the branches of these three

great groups should appear in addition to the scientific methods of Logic and Mathematics. A reference to history shows that this imperfect condition is not only unnatural and unreasonable but without precedent, and we conclude that a return to the natural condition would greatly improve the efficiency of the general education given in our universities, at the same time raising the standard of culture by offering to specialists and professional men the additional attraction of an Arts degree that would be directly as well as indirectly useful in after life.

III

Application of the foregoing to Edinburgh University.

Though the application of theories to the details of a particular case is a task of extreme difficulty, yet it affords a most excellent test of their soundness and practical value. We will, therefore, examine briefly the bearing of the foregoing analysis and criticism of university training in general upon the actual working of our own Arts Faculty in particular.

The teaching organisation in Edinburgh.

In our own Alma Mater, then, we have a magnificent educating organisation including many teachers and classes which very rightly prepare for the professions or instruct in subjects which students care to pursue outside the courses recognised as qualifying for degrees. No one could wish to include within the regular work of the Arts Faculty study of the subjects proper to the three great professional Faculties, nor yet of those belonging to education, agriculture or engineering. There is besides another group of subjects which at present obviously could not well be recognised as qualifying for the ordinary degree in Arts.

Such are the less read languages like Celtic & Sanskrit, and branches of science such as embryology. The Fine Arts are in a similar position as we have already seen, though in the dim future they may be included amongst the possibilities of the Arts Course. But there are several subjects actually and efficiently taught in the University which Professors and Students alike hold should qualify for an Arts degree, the arguments being those brought forward in the preceding portion of this paper. Below is a list of the classes which should logically be included in the Faculty, the under-lined being the ones actually included.

Latin

Greek

Rhetoric & English Literature

Mathematics

Natural Philosophy

Chemistry

Geology

Botany

Zoology

Physiology

Logic & Psychology

Moral Philosophy

History

Political Economy

The use
that is
made of
this or-
ganisation,
& the use
that might
be.

We see that the literary element is fully represented and that Mathematics and Logic are adequately applied to Physics, Psychology & Ethics both scientifically and philosophically, so that for some men with some aims in life, the education is complete and very closely approaches our standard of excellence. A glance at the list shows that all the mechanism is at hand which is needed to make it practically perfect in relation to the requirements of the age. All that must be done is to make it fully available, to let it do all the work of which it is capable instead of restricting its action. To perfect the system no revolution is needed, slight evolutionary changes are enough, and they will come at their own time and in the most convenient way.

The first change, apparently, will be to put the natural sciences on the same level as the physical, and to make it optional in which of them a student will graduate, giving him a choice of special subjects within each of these larger divisions. The Philosophical department will probably remain in statu quo but with freedom of choice between its properly included subdivisions.

It must be left to thinkers more speculative and idealistic than the present writer to imagine the state of things when we shall have attained ideal simplicity, when music and painting shall be held equal in educational value with literature, when physical and natural science shall have become so philosophic and mental sciences so scientific that any one of them shall be held to be an ample field for a man's mental development.